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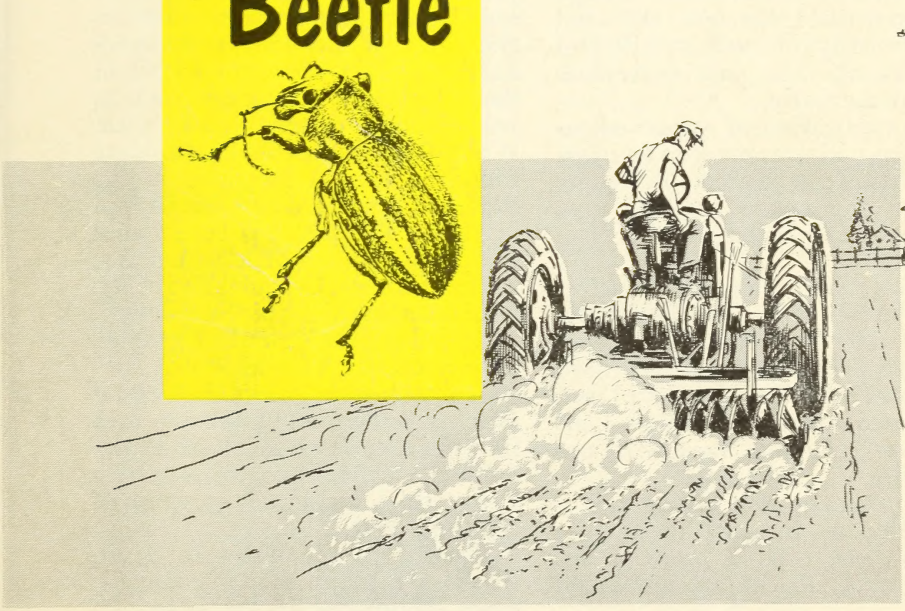
the White-Fringed Beetle



HOW TO CONTROL IT

Leaflet No. 401

the White-Fringed Beetle

HOW TO CONTROL IT

The white-fringed beetle[1] seriously damages field and garden crops and ornamental plants. It will feed on almost any kind of plant—from wild asters, blackberries, and cockleburs to peanuts, cotton, potatoes, tobacco, and corn.

The larvae, or grubs, do most of the damage. They live in the soil and feed on the roots of the plants. Adult beetles feed on the foliage but cause little damage. Affected plants usually turn yellow, wilt, and die. Those that survive seldom develop normally.

The application of approved insecticides will prevent crop damage. Eradication can be accomplished by treating the entire infested area and protecting its boundaries from reinfestation.

Before the development of effective control measures, the beetles caused widespread damage. Farmers near Florala, Ala., were hard hit in 1936, 1937, and 1938. Damage was so severe in 1938 that 1,500 acres of cropland were left unplanted.

Crop damage still occurs, but it is limited to infested lands that haven't been treated properly for the control of the white-fringed beetle.

ORIGIN AND SPREAD

White-fringed beetles are native to Argentina, Brazil, Chile, and Uruguay. Infestations also have been reported in New South Wales, Australia, and the Union of South Africa. In the spring of 1936, a farmer near Svea, Okaloosa County, Fla., reported a field of peanuts damaged by numerous small grubs to his county agricultural agent. During the summer of that year the county agent collected adults of the insect. These were identified as white-fringed beetles, not previously known in the United States.

The pest was reported the same year from the northern part of Walton County, Fla., and around Florala, Ala. In May 1937, destructive numbers of larvae were found in these localities attacking peanuts, velvetbeans, cotton, and corn. White-fringed beetles also were found at several localities in the States of Louisiana and Mississippi in 1937. The pest has been found in limited portions of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, New Jersey, North Carolina, South Carolina, Tennessee, and Virginia.

Entomologists believe that white-fringed beetles could survive in a latitude somewhat north of Philadelphia, extending to southern Iowa, which includes large areas of the Corn Belt.

Records of the insect in South America indicate that it could become established in irrigated sections, such as those in Western United States.

White-fringed beetles cannot move any great distance on their own. The larvae are legless, and move only a few feet in the soil while they are feeding. The adults cannot fly but may crawl up to one-fourth mile during their lifetime.

The beetles spread to new areas primarily in commerce. Adults

[1] *Graphognathus* spp.

Larval damage to cotton field

may attach themselves to seed cotton, hay, agricultural implements, or even to man. Larvae may be spread by the movement of soil, sod, nursery stock, and root crops, such as potatoes. Hay harvested from infested fields in late summer and fall may contain viable eggs.

DAMAGE

The principal damage is caused by larvae feeding on the roots and underground stems of plants. White-fringed beetles do not usually cause uniform damage over large continuous areas. Crop injury may range from just a trace in one part of a field to destruction of a crop in a nearby field.

In general, plants with main roots (tap roots) are damaged more severely by the larval stage of the insect than those with fibrous roots. The larvae may sever the main root while they are feeding. On root crops, such as potatoes, carrots, and turnips, they burrow directly into the roots, or tubers, and destroy the market value of the crop.

The larvae and adults do not always feed on the same plant species. Many of these plants or their close relatives are widely distributed in the United States. Plant hosts will therefore not be a limiting factor in the spread of these insects.

In the field, white-fringed beetle adults have been found to feed on more than 170 species of plants including field, garden, and truck crops, weeds, ornamental shrubs, flowers, wild bushes, vines, and trees. Larvae have been observed feeding on 240 species of plants, some of the most common being alfalfa, beans, carelessweed, carrot, chrysanthemum, chufa, clover, cocklebur, corn, cotton, cowpea, curled-dock, Irish potato, lupine, mustard, oats, peanuts, peas, ragweed, soybean, strawberry, sweetpotato, tobacco, and velvetbean. The larvae also feed on the roots of young woody plants such as peach, pecan, tung, and willow, as well as on parts of dead plants in the soil. The adult beetle prefers to feed on plants having broad leaves.

A number of factors may influence the intensity of an infestation. The beetles are more abundant—and damage is greater—in well-drained, sandy loam than in heavy clay soils. An unusually dry summer may retard the beetle's development. A heavy rainfall, which saturates the soil for about a week, kills many young larvae.

DEVELOPMENT

The white-fringed beetle passes through the following stages: Adult, egg, larva, and pupa. It usually produces only 1 generation a year, and spends all but about 3 months in the soil.

Adults begin emerging from the soil in early May and continue to do so until early fall, the exact time of emergence depending on the locality. They are dark gray, are about 7/16 inch long, and have a white fringe, or band, along the outer edges of the body. They feed on margins of leaves for several days and then begin laying eggs. All adults are females and are capable of laying fertile eggs.

The eggs are laid in masses in the soil (usually near the roots of a plant), or at the point of contact between soil and objects such as sticks, gravel, plant stems, and other things lying on or protruding from the soil. They are covered with a sticky substance that hardens upon drying and holds them together and also to the object on which they are deposited.

An egg mass usually contains 11 to 14 eggs, but some masses have up to 60 eggs. Each egg is about 1/25 inch long.

How many eggs an adult lays and how fast she lays them depend upon the kind of plant on which she feeds. In tests conducted by entomologists at Florala, Ala., beetles that fed on peanut foliage laid an average of 1,600 eggs (one beetle laid 3,258 eggs), but those that fed on grasses laid an average of only 4 eggs. Legumes and broad-leaved plants, such as cocklebur, ragweed, peanuts, soybeans, and strawberries, induce heavy egg laying; while cowpeas, blackberry, lespedeza, Mexican clover, pecan, and tobacco have the opposite effect.

Adults live 2 to 5 months, and lay eggs much of that time in the presence of favored foods.

The right combination of temperature and moisture is required for the eggs to hatch. Eggs laid during the summer usually hatch in about 17 days. But those laid during the fall and winter require longer periods—sometimes as much as 100 days. Some eggs may remain viable throughout the winter and hatch the following spring.

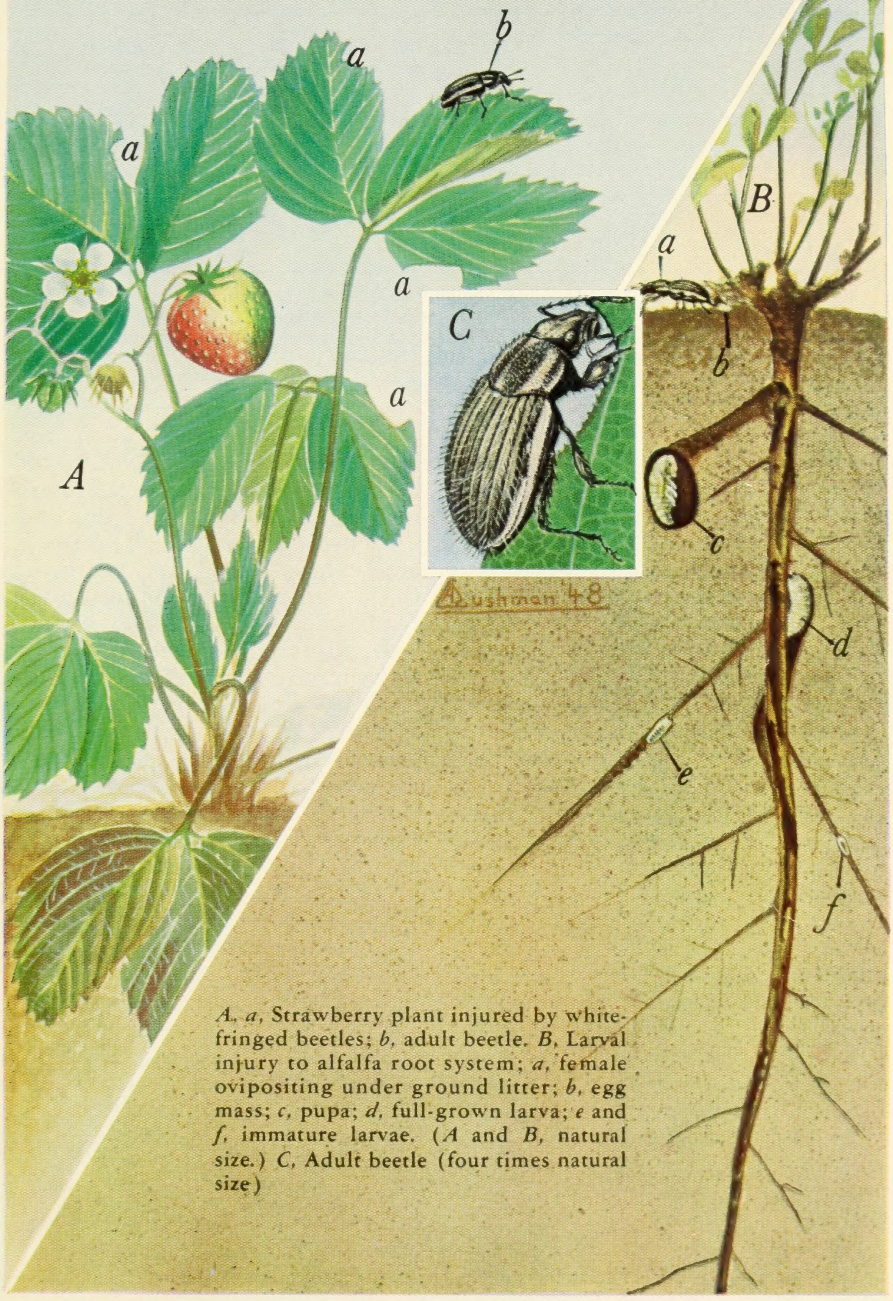
The larvae are yellowish-white grubs that are up to 1/2 inch long. They enter the soil and feed almost constantly. As they grow, they molt, or shed their skins, several times. It usually takes about 11 months for the larvae to develop, but under certain conditions some larvae require 2 years or more.

Normally, these insects pass the winter as larvae in the soil, but they may overwinter as eggs. In the spring and summer, the larvae construct cells 2 to 6 inches below the soil surface where they transform into pupae. In about 13 days, the adults emerge.

CONTROL

Cultural control.—Farmers can suppress heavy white-fringed beetle infestations and prevent the pest from becoming numerous by following certain cropping systems. These measures vary with the crops grown and rotations practicable in different areas. The general principles of cultural control is the rotation of crops favored by the beetle, such as peanuts, soybeans, and velvetbeans, with crops that are unfavorable to it, such as pasture grasses, small grains, and corn. Corn should be planted solid not inter-cropped with legumes. Favored host crops should not be grown more often than once in every two or three years on the same land. Plants with fibrous root systems do not suffer as heavy damage by the larvae as those having taproots. The addition of organic matter to the soil also causes a reduction in damage by white-fringed beetle larvae, one of the most eco-

WHITE-FRINGED BEETLE



A, *a*, Strawberry plant injured by white-fringed beetles; *b*, adult beetle. *B*, Larval injury to alfalfa root system; *a*, female ovipositing under ground litter; *b*, egg mass; *c*, pupa; *d*, full-grown larva; *e* and *f*, immature larvae. (*A* and *B*, natural size.) *C*, Adult beetle (four times natural size)

Type of land and treatment	Insecticide [1]	Type of application			
		Broadcast		Drill row [2]	
		Pounds per acre	*Years effective*	*Pounds per acre*	*Years effective*
Cultivated (soil treatment).	Aldrin	2	3 or more	¾ to 1	1
	Chlordane	5	3	1 to 2	1
	DDT	10	4	2 to 3	1
	Dieldrin	1½	4 or more	½ to ¾	1
	Heptachlor	2	3 or more	¾ to 1	1
Noncultivated (surface treatment).[3]	Dieldrin	3	4 or more		

[1] Use only on crops on which they are currently approved.

[2] Row treatment not recommended on vegetable crops. Deposit below depth of seed. If the distance between drills is less than 3½ feet, apply the maximum dosage; if it is more than 6 feet, apply the minimum dosage.

[3] Application should be made only under general direction of Federal or State plant pest control personnel.

nomical methods being the turning under of winter-grown cover crops.

Insecticidal control.—White-fringed beetles can be controlled or eradicated through the use of approved insecticides. The dosages shown in the table are for control and the prevention of crop damage. For eradication, heavier dosages and broadcast applications are required. Several insecticides are recommended: aldrin, chlordane, DDT, dieldrin, and heptachlor, each of which has a long residual effect and when used in the recommended manner will give control for several years. These insecticides are available in several types of formulations, each of which is effective: emulsifiable concentrates or wettable powder, from which sprays can be prepared; dust, or granules. Sprays, dusts, or granules may be applied by power or hand equipment or by airplane.

The best method of controlling the insect is to kill the larvae with a soil application of one of the approved insecticides.

To control the beetles in cultivated land, broadcast aldrin, chlordane, DDT, dieldrin, or heptachlor on the soil surface and immediately after application thoroughly mix the insecticide into the upper 3 inches of the soil. The insecticide can be mixed into the soil by the use of a disk or other suitable farm implement.

In applying the insecticide to the soil surface, every effort should be made to obtain an even coverage. If the field is covered with heavy vegetative growth, it is recommended that it be plowed prior to the application of the insecticide as this will be helpful in obtaining an even distribution.

An alternate treatment which will give crop protection is to apply one of the recommended insecticides, alone or mixed with fertilizer, in the drill row at the time of planting. This is not as good as the broadcast method in reducing the beetle population, especially the first year; however, its use over a period of years will result in good control.

Noncultivated land, such as lawns, industrial and railroad properties, roadsides, and wasteland, that is not used for grazing animals can be treated with a surface appli-

cation of dieldrin. Surface applications require heavier dosages than soil applications. Granulated dieldrin should be applied uniformly over the area to be treated while the plant foliage is dry. For best results, apply the insecticide only during the winter and early spring. When applying the insecticide, precaution should be taken to prevent the contamination of streams, ponds, watering troughs, to protect animals, fish, and wildlife.

Pasture and Forage Crops

For treatment of hay crops, pastures, and established stands of forage legumes, consult an inspector of the Plant Pest Control Division, your State regulatory agency, or your county agricultural agent.

PREVENTION

The white-fringed beetle is a potential threat to many agricultural areas of the United States. That is why it is important for individual growers to be able to locate an infestation before it becomes widespread.

Quarantines

The primary purpose of the quarantines is to prevent the spread of the white-fringed beetle by regulating the movement of articles that may carry infestations. The work is carried on in several ways:

1. Regulatory officials in regulated areas certify certain plants, crops, implements, soil, forest products, and other articles before they can be shipped into nonregulated areas of this country. To be eligible for certification, the article must be produced, handled, processed, or treated in such a way as to be free of white-fringed beetles. An approved insecticidal soil treatment that is used as a basis for certification of plants in soil will free nursery lands of white-fringed beetles.

2. Insecticides are applied or other preventive measures are taken, at production and shipping points to prevent infestation of products. In addition, insecticides are used by individuals, industries, and communities to treat fields, railroad yards and sidings, storage areas, nurseries, and roadways. The treatment of these areas, done under the leadership of Federal and State officials, lessens the chance of accidental and natural spread of the beetles.

How You Can Help

Every plant grower—farmer, vegetable and flower gardener, homeowner, nurseryman—can assist Federal and State pest control agencies by locating white-fringed

Applying granular insecticide to soil

beetle infestations and reporting them promptly.

If you find adults and larvae that resemble those in the colored drawings, place them in a small bottle of 70 percent alcohol and send it to your county agricultural agent, nearest Plant Pest Control Division inspector, or State department of agriculture, or to your State entomologist.

When sending specimens, include your name and address, and tell where and when the insects were found. *Do not send live insects through the mail.*

HOW TO LOOK FOR THE WHITE-FRINGED BEETLE

You can determine whether the white-fringed beetle is present by looking for the larvae and adults.

Look for Larvae

1. Look for larvae, or grubs, in soil around the roots of plants, particularly plants that are wilting or dying.

2. Inspect young plants, particularly seedlings, during the spring months in farm fields, vegetable gardens, and flower beds, for abnormal symptoms, such as wilting, reddening, and yellowing. Examine the soil where skips occur in the rows of plants.

3. Dig out abnormal plants by the roots and break the soil apart. Look for larvae on the roots, and also in soil. It is often necessary to examine the roots and soil of several wilting or yellowing plants before finding larvae.

Look for Adults

1. Examine the outer edges of the leaves for sawtooth cuts; adults do not make holes in the leaves. (See colored drawing on p. 5 for leaf damaged by adults.)

2. Inspect cultivated crops, such as soybeans, velvetbeans, peanuts, cotton, and clover to see if the outer edges of the leaves show insect damage.

3. Look for adults on broad-leaf weeds growing in the fields, along the terraces, turn rows, or fence lines. (Where both small grains and weeds are found in the field the adults will feed on the weeds.)

4. Look around the base of the plant, under leaves, or in grass if you don't find adults on the leaves.

PRECAUTIONS

Insecticides are poisonous. Use them only when needed and handle them with care. Follow the directions and heed all precautions on the container label. Insecticides should be kept in closed, well-labeled containers, in a dry place where they will not contaminate food or feed, and where children and pets cannot reach them.

Aldrin, chlordane, dieldrin, and heptachlor can be absorbed directly through the skin in harmful quantities. When handling or mixing these insecticides, avoid spilling them on the skin and keep them out of eyes, nose, and mouth. If any is spilled on the skin, bathe and change clothing immediately. If it gets in the eyes, flush with plenty of water for 15 minutes and get medical attention.

To protect fish and wildlife, do not contaminate streams, lakes, or ponds with the insecticides.

Avoid drift of insecticide sprays or dusts to nearby crops or livestock, especially from applications by airplane and other power equipment. Do not allow poultry, dairy animals, or meat animals to feed on plants or drink water contaminated by drift of insecticides.

Prepared by

PLANT PEST CONTROL DIVISION and
ENTOMOLOGY RESEARCH DIVISION,
AGRICULTURAL RESEARCH SERVICE

Revised July 1962 Washington, D.C.

The white-fringed beetle can be mistaken for other insects. The natural-color illustration on p. 5 will help you to distinguish it from similar looking beetles.

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Washington 25, D.C. - Price 10 cents

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